DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 5

Topic :- Electro Magentic Induction

1 **(b)**

$$\frac{L_B}{L_A} = \left(\frac{n_B}{n_A}\right)^2 \Rightarrow L_B = \left(\frac{500}{600}\right)^2 \Rightarrow 108 = 75\ mH$$

2 **(a)**

Though emf is induced in the copper ring, but there is no induced current because current because of cut in the ring. Hence nothing opposes the free fall of the magnet. Therefore, $a =$ g.

3 **(b)**

Power $P = \frac{e^2}{R}$; hence $e = -\left(\frac{d\phi}{dt}\right)$ where $\phi = NBA$

$\therefore e = -NA\left(\frac{dB}{dt}\right)$. Also $R \propto \frac{1}{r^2}$

Where $R =$ resistance, $r =$ radius, $l =$ length

$$\therefore P \propto \frac{N^2 r^2}{l} \Rightarrow \frac{P_1}{P_2} = 1$$

4 **(a)**

$$\frac{N_s}{N_p} = \frac{V_s}{V_p} \Rightarrow \frac{250}{100} = \frac{V_s}{28/\sqrt{2}} \Rightarrow V_s = 50\ V$$

5 **(d)**

$$e = Bl^2\pi v = 0.4 \times 10^{-4} \times (0.5)^2 \times (3.14) \times \frac{120}{60}$$

$$= 6.28 \times 10^{-5} V$$

6 **(b)**

As x increases so $\frac{dB}{dt}$ increases, *i.e.*, induced emf (e) is negative. When loop completely enters in the magnetic field, emf $= 0$

When it exists, x increases but $\frac{dB}{dt}$ decreases, *i.e.*,e is positive

7 **(b)**

$$U = \frac{1}{2}Li^2, i.e., \frac{U_2}{U_1} = \left(\frac{i_2}{i_1}\right)^2 = \left(\frac{1}{2}\right)^2 = \frac{1}{4} \Rightarrow U_2 = \frac{1}{4}U_1$$

8 **(c)**

Given, $L = 10\text{H}, f = 50$ Hz

For maximum power

$$X_C = X_L$$

$$\frac{1}{\omega C} = \omega L$$

$$C = \frac{1}{\omega^2 L}$$

$$\therefore \quad C = \frac{1}{4\pi^2 \times 50 \times 50 \times 10}$$

$$C = 0.1 \times 10^{-5}\text{F} = 1\ \mu\text{F}$$

9 **(c)**

$\eta = \frac{e}{E} \times 100 \Rightarrow e = 0.3\,E$

Now, $i = \frac{E-e}{R} \Rightarrow 12 = \frac{50-(0.3\times 50)}{R} \Rightarrow R = 2.9\Omega$

90 **(c)**

Total charge induced in a loop depends on resistance and change in magnetic flux linked with the loop.

11 **(b)**

In transformer

$$\frac{n_p}{n_s} = \frac{V_P}{V_S}$$

$$= \frac{5000}{240} = 20.8$$

12 **(b)**

If resistance is constant (10Ω) then steady current in the circuit $i = \frac{5}{10} = 0.5\,A$. But resistance is increasing it means current through the circuit starts decreasing. Hence inductance comes in picture which induces a current in the circuit in the same direction of main current. So $i > 0.5\,A$

13 **(b)**

$e \propto \omega$

14 **(c)**

$\frac{N_s}{N_p} = \frac{V_s}{V_p} \Rightarrow \frac{1}{20} = \frac{V}{2400} \Rightarrow V_s = 120\,V$

For 100% efficiency $V_s i_s = V_p i_p$

$\Rightarrow 120 \times 80 = 2400\,i_p \Rightarrow i_p = 4\,A$

15 **(d)**

From, Faraday's second law,$e = -\frac{d\Phi}{db}$

$= -[12t - 5]$

$= -[12 \times (0.25) - 5] = +2$

Now, $i = \frac{e}{R} = \frac{2}{20} = 0.1$ A

16 **(d)**

Efficiency of a transformer,

$$\eta = \frac{\text{Power output}}{\text{Power input}}$$

For an ideal transformer, $\eta = 1$

$\therefore$ Power output = Power input $= 60\ W$

18 **(b)**

Induced e.m.f. $= Blv = 0.3 \times 10^{-4} \times 10 \times 5$

$= 1.5 \times 10^{-3} V = 1.5\ mV$

19 **(b)**

Magnetic flux , $\phi = \int \mathbf{B.dA} = BA\cos\theta$,where θ is angle between normal to the area dA with magnetic field B.

Here, $\theta = (90° - 30°) = 60°$

and $\theta = 10^{-4} \times \pi\left[\frac{21}{2} \times 10^{-2}\right]^2 \times \cos 60°$

$= 1.732 \times 10^{-6}\text{Wb}$

20 **(c)**

Current in B_1 will promptly become zero while current in B_2 will slowly tend to zero

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	A	B	A	D	B	B	C	C	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	B	B	C	D	D	D	B	B	C